Check List the journal of biodiversity data

NOTES ON GEOGRAPHIC DISTRIBUTION

Check List 12(3): 1895, 8 June 2016 doi: http://dx.doi.org/10.15560/12.3.1895
ISSN 1809-127X © 2016 Check List and Authors

New host and locality records for chiropteran ectoparasites from Jujuy and Salta provinces, Argentina

Analía G. Autino[1*], **Felix Ortiz**[2, 5], **Guillermo L. Claps**[3] and **J. César Bracamonte**[4, 5]

1 Programa de Investigaciones de Biodiversidad Argentina, Facultad de Ciencias Naturales e Instituto Miguel Lillo, Universidad Nacional de Tucumán. Miguel Lillo 205 (4000), San Miguel de Tucumán, Tucumán, Argentina
2 Instituto de Biología de la Altura, Universidad Nacional de Jujuy. Av. Bolivia 1661 (4600), San Salvador de Jujuy, Jujuy, Argentina
3 Instituto Superior de Entomología "Dr. Abraham Willink", Facultad de Ciencias Naturales e Instituto Miguel Lillo, Universidad Nacional de Tucumán, Argentina
4 Instituto de Bio y Geo Ciencias del Noroeste Argentino-CONICET. Mendoza 2 (4400), Salta, Argentina
5 Centro de Investigaciones y Transferencia Jujuy-CONICET. Av. Bolivia 1270 (4600), San Salvador de Jujuy, Jujuy, Argentina
* Corresponding author. E-mail: agautino@yahoo.com.ar

Abstract: Among ectoparasites sampled from bats during diversity surveys in 2005 and 2008 in northern Argentina there were specimens of *Paradyschiria parvula* Falcoz, 1931 (Diptera, Streblidae) and *Hesperoctenes vicinus* Jordan, 1922 (Hemiptera, Polyctenidae) that represent first records for Argentina and Salta province, respectively. New ectoparasite-host associations and additional distributional records of ectoparasites were also recorded and are given for Jujuy and Salta provinces.

Key words: Chiroptera; Ischnopsyllidae; Nycteribiidae; Polyctenidae; Streblidae; Tungidae

The associations between hosts and ectoparasites have important implications both ecologically and evolutionarily. In Argentina, while several studies have greatly increased the availability of information regarding the relationship between ectoparasite insects (Diptera, Hemiptera and Siphonaptera) and bats (e.g., Autino et al. 1999, 2005, 2009, 2014; Autino and Claps 2000; Claps and Autino 2012), these studies have focused fundamentally on taxonomy, lacking an ecological analysis about this interaction. Studies that also provide such data (e.g., Marshall 1982; Patterson et al. 1998; Poulin, 1998; Presley, 2004; terHofstede et al. 2004; Dick 2005, 2007; Dick et al. 2007) can contribute not only to investigations on specificity and cospeciation, but also on ectoparasite biology, behaviour, biodiversity, and natural history.

Ectoparasite insects show different degrees of specificity. Streblidae and Nycteribiidae (Diptera), Ischnopsyllidae (Siphonaptera), and Polyctenidae (Hemiptera), for example, are obligate hematophagous bat parasites, while Tungidae (Siphonaptera) may be found on several birds and mammals (Johnson 1957; Autino and Lareschi 1998; Beaucournu and Castro 2003).

During field research at several localities in Argentina (Figure 1), 41 bats were captured using mist nets and were identified following Barquez (2006) and Díaz et al. (2011). The bats were identified as belonging to seven species in three families: *Eptesicus furinalis* d'Orbigny, 1847, *Myotis keaysi* J.A. Allen, 1914, *M. nigricans* Schinz, 1821, and *Histiotus laephotis* Thomas, 1916, in Vespertilionidae; *Noctilio albiventris* Desmarest, 1818, in Noctilionidae; and *Molossops temminckii* (Burmeister,

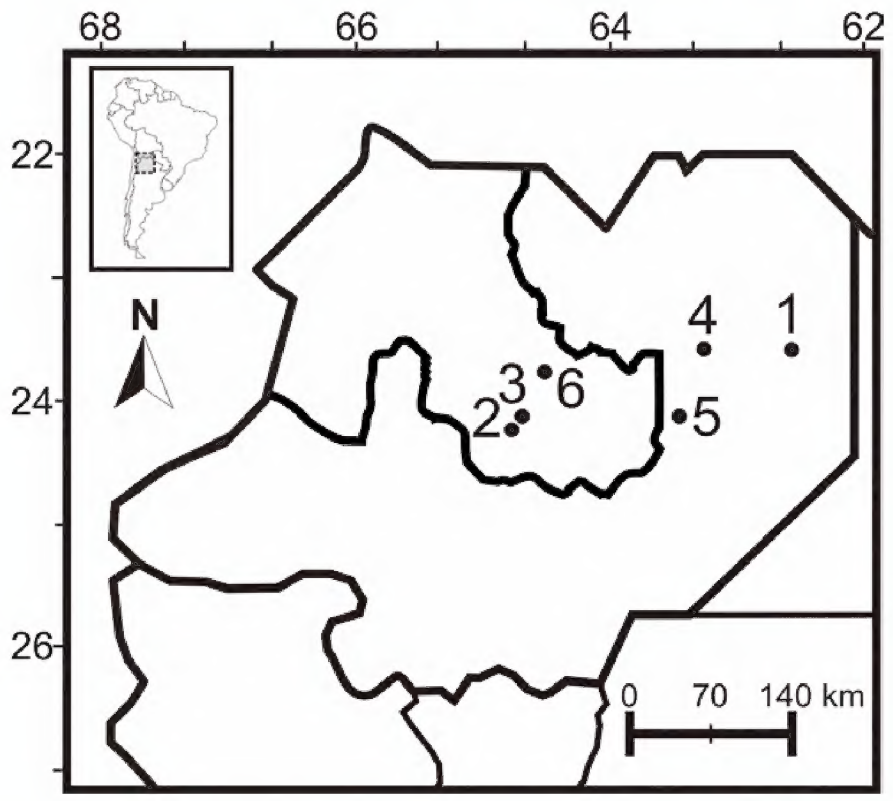

Figure 1. Map of studied localities in northern Argentina, listed in order of appearance in the text. 1) Salta: Department Rivadavia, Pozo Cercado. 2) Jujuy: Department Dr. Manuel Belgrano, Parque Provincial Potrero de Yala = Laguna Rodeo. 3) Jujuy**:** Department Dr. Manuel Belgrano, Cuesta de Jaire. 4) Salta: Department Orán, La Estrella. 5) Salta**:** Department Orán, Finca Chaguaral. 6) Jujuy**:** Department Ledesma, Aguas Negras, Parque Nacional Calilegua.

1854) and *Tadarida brasiliensis* (I. Geoffroy, 1824), in Molossidae. They were all captured by one of the current authors (JCB), and vouchers were further prepared as skin and skull following Díaz et al. (1998). Most of the bats were released at the studied sites because, in previous field trips to these areas, we had almost reached the maximum number of vouchers that could be prepared under the collection license from the Dirección Provincial de Políticas Ambientales y Recursos Naturales de la Provincia de Jujuy (Res. 213/2007-DPPA and RN) and Res. 124/2006-DPPAyRN. Voucher specimens are deposited in the Colección Mamíferos Lillo (CML), Universidad Nacional de Tucumán, Tucumán, Argentina. Individuals were visually checked for the presence of ectoparasites following the methodology of Autino et al. (1999). Ectoparasites were identified using the keys of Guimarães and D'Andretta (1956), Hopkins and Rothschild (1956), Johnson (1957), Ueshima (1972), Wenzel (1970, 1976), and Guerrero (1995, 1997). Ectoparasite specimens were all placed in 70% ethylic alcohol and examined using a stereoscopic microscope. Some specimens were then mounted in Canada balsam, following standard techniques for identification with an optical microscope. The ectoparasites were deposited at the Instituto de Biología de la Altura (INBIAL), Universidad Nacional de Jujuy, Argentina, and at the Colección Mamíferos Lillo Annexes (CMLA).

In the following list, orders, families, and species of ectoparasites are arranged according to their phylogenetic relationships. In the detail for each species, we present the following information: number of specimens examined; province, department, locality, and geographical coordinates of the collection site; number of examined specimens by gender; host identification, number, and gender; and date of collection (day /month /year). Taxonomic comments and data from previous relevant records related to each species are also presented.

Hemiptera (Polyctenidae)

Hesperoctenes vicinus Jordan, 1922

Specimens examined (4). Salta: Department Rivadavia, Pozo Cercado (23°21′18.1″ S, 062°44′22.8″ W): 1 ♀, 3 ♂ (1 ♀ CMLA-11 and three ♂ CMLA-8, CMLA-9, CMLA-10) collected on two females of *Molossops temminckii* (released), 11-VIII-2005.

Comments. Previously cited for Paraguay as "probably" on *Molossus rufus* É. Geoffroy, 1805 (= *M. ater*; Ueshima 1972) and for Argentina on *M. temminckii* (Autino et al. 2009). This species is recorded for the first time from the province of Salta.

Taxonomy. This species is characterized by patches or rows of bristles on the medial posterior margin of the underside of the head. The bristles located on other parts of the body are sparse and distributed irregularly, including numerous bare areas on the pronotal disk. The gular crest is defined by an irregular double row of six to eight bristles on the middle of the hind margin. Antennal segments I and III are equal in length, and the labrum is proportionally three times wider than long.

Siphonaptera (Tungidae)

Hectopsylla (Rhynchopsyllus) pulex (Haller, 1880)

Specimens examined (4). Jujuy: Department Dr. Manuel Belgrano, Parque Provincial Potrero de Yala (24°06′45.81″ S, 065°28′41.05″ W): 1 ♂, 3 ♀ (1 ♂ INBIAL Siph. Tungidae 0005, 1 ♀ INBIAL Siph. Tungidae 0006, 1 ♀ INBIAL Siph. Tungidae 0007, 1 ♀ INBIAL Siph. Tungidae 0008) collected on four specimens of *Tadarida brasiliensis* (1♂ and 3 ♀ released), 24–25-X-2006 and 05-XII-2007.

Comments. This species has been recorded for the provinces of Buenos Aires, Catamarca, Salta, and Tucumán (Autino and Claps 2000), as well as for Jujuy (Autino et al. 2009). In this study a new locality is given for Jujuy.

Taxonomy. This species is distinguished by the gentle rounding of the anterior margin of the head, correspondingly lacking a frontal angle. The eyes are very small, with a large sinus and no black pigmentation. The maxilla is almost three times as long as it is broad; the basal half is sharply convex posteriorly and a somewhat concave anteriorly, while the distal half is narrow, tapering to a sharp point with a slight backwards curvature. Segment I of the maxillary palp is strongly arched, twice as long as segment III, and distinctly longer than segments II and IV, which are subequal. An oblique fracture is present on the entire mesocoxa, and the sternum lacks bristles. Hind tarsal segment IV has five pairs of stout lateral bristles and is notably absent of sub-apical plantar bristles. The spermatheca is S-shaped with its orifice conically projected.

Siphonaptera (Ischnopsyllidae)

Myodopsylla isidori (Weyenbergh, 1881)

Specimens examined (2). Jujuy: Department Dr. Manuel Belgrano, Cuesta de Jaire (24°01′29.14″ S, 065°24′50.70″ W): 1 ♀, 1 ♂ (1♀ INBIAL Siph. Ischnopsyllidae 0009, 1 ♂ INBIAL Siph. Ischnopsyllidae 0010) collected on a female *Myotis keaysi* (released), 10-X-2008.

Comments. This species is widely distributed in Argentina. It was cited on *Myotis albescens* (É. Geoffroy, 1806), *M. chiloensis* (Waterhouse, 1840), *M. keaysi*, *M. levis* (I. Geoffroy, 1824), *M. nigricans*, *Myotis* sp., and *Tadarida brasiliensis* (Del Ponte and Riesel 1939; Hopkins and Rothschild 1956; Del Ponte 1977; Autino et al. 1999, 2000, 2009). It has also been recorded by Autino et al. (2009) for Jujuy, Salta, and Tucumán. In this study new localities are added for the province of Jujuy.

Taxonomy. Developed false combs are present on the terga I and II of the abdomen. On the terga III to VI of females, one or two of the bristles nearest the dorsal margins are slightly thicker and closer together, forming incipient false combs. Males exhibit acetabular bristles that resemble those of *M. w. wolffsohni*, similarly movable, but narrower (proportionate to the length) and with much blunter apical angles. In females, the spermatheca is indistinguishable from that of *M. w. wolffsohni*.

Myodopsylla wolffsohni wolffsohni (Rothschild, 1903)

Specimens examined (1). SALTA: Department Orán, La Estrella (23°48′51.06″ S, 064°05′50.49″ W): 1 ♀ INBIAL Siph. Ischnopsyllidae 0011, on a male *Myotis nigricans* (released), 14-XII-2006.

Comments. In Argentina, this species has been recorded from Tucumán, on *Eumops perotis* (Schinz, 1821) (Schreiter and Shannon 1927), and from Corrientes and Salta, on *M. albescens* (Claps and Autino 2012). It was also recorded on *M. chiloensis* from Entre Ríos (Del Ponte 1977), though this identification could be questionable if we consider that *M. chiloensis* has only been recorded in Neuquén, Chubut, and Santa Cruz (Barquez 2006). Here, a new locality is given for the province of Salta.

Taxonomy. The species is characterized by a distinctly convex forehead. Both sexes exhibit false combs but only on abdominal terga I and II, while the incipient false combs are absent on the abdominal terga III and IV. Tergum I of the abdomen presents well-developed false combs consisting of about six bristles on each side, while those of the tergum II are composed of four bristles apiece. The claspers exhibited by the males of the species have an acetabular projection bearing two narrowly spaced long bristles and an almost anvil-shaped movable process.

Diptera (Streblidae)

Anatrichobius scorzai Wenzel, 1966

Specimens examined (1). JUJUY: Department Dr. Manuel Belgrano, Parque Provincial Potrero de Yala (24°06′45.81″ S, 065°28′41.05″ W): 1 ♀ INBIAL Dip. Streblidae 0012, on a *Myotis nigricans* ♀ (released), 18-V-2005.

Comments. This species has been recorded for Tucumán on *Myotis keaysi* (Autino et al. 1999; Claps et al. 2000) and for Jujuy on *M. albescens* and *M. keaysi* (Autino et al. 2009), all Vespertilionidae. The association with *M. nigricans*, previously recorded for Venezuela and Bolivia (Dick et al. 2007), is new for Argentina. A new locality is also given for the province of Jujuy.

Taxonomy. The species is distinguished by having a broad pyriform head with a convex dorsum. The median suture of the thorax is usually conjoined with the transverse suture, though occasionally it extends slightly beyond the middle, whereas the transverse suture is usually complete. The notopleural fissure is membranous, and the brachypterous wings have notably variable venation. Males possess a sternite V and gonopods with two long ventral setae. Females have a tergum VII and the heart-shaped epiproct has 10 to12 setae.

Paradyschiria parvula Falcoz, 1931 (Figures 2 and 3)

Specimens examined (6). SALTA: Department Rivadavia, Pozo Cercado (23°21′18.1″ S, 062° 44′22.8″ W): 4 ♂ and 2 ♀ on a male *N. albiventris* (CML 9731), 08-XI-2006. Four ectoparasite specimens (3 ♂ and 1 ♀) were deposited at INBIAL (1 ♀, INBIAL Dip. Streblidae 0001, and three ♂ INBIAL Dip. Streblidae 0002, INBIAL Dip. Streblidae 0003, and INBIAL Dip. Streblidae 0004) and two (1 ♂ and 1 ♀) at CMLA (♀ CMLA-1 and ♂ CMLA-2). The genitalia of the male INBIAL 0004 was specially mounted.

Comments. This species has been recorded for Bolivia, Brazil, Colombia, Peru, Trinidad, and Venezuela (Figure 4) (Guerrero 1995). Although its primary host is *N. albiventris* (Noctilionidae), this species has also been found parasitizing *Rhynchonycteris naso* (Wied-Neuwied, 1820) (Emballonuridae), *Uroderma* sp. (Phyllostomidae), *Molossus ater* É. Geoffroy, 1805 (= *Molossus rufus*; Barquez 2006), and *M. aztecus* Saussure, 1860 (Molossidae). The reviewed males clearly present ventrally directed postgonite tips that are almost strait, and gently thin out along their extension (Guerrero 1995). This is the first record of this ectoparasite for Argentina.

Taxonomy. The mesonotum present in both sexes of the species is discriminated by an abbreviated (occasionally absent) seta located anterior and lateral to the extended long macroseta of the posterolateral angle. Females specifically exhibit an elongation of sternite VII (length is greater than the width), with normal setae bordering the apical margin. Males have a tapered postgonal apex in which the ventral margins are nearly straight, but the apices are distinctly hooked.

Diptera (Nycteribiidae)

Basilia currani Guimarães, 1943

Specimens examined (1). JUJUY: Department Dr. Manuel Belgrano, Laguna Rodeo, Parque Provincial Potrero de Yala (24°06′45.81″ S, 065°28′41.05″ W): 1 ♀ (INBIAL Dip. Nycteribiidae 0013) on a female *M. nigricans* (released), 27-IX-2006.

Comments. This species has been found in association with *Myotis levis* in Catamarca and La Rioja (Guimarães and D' Andretta 1956; Autino et al. 2000),

Figure 2. General view of *Paradyschiria parvula* Falcoz, 1931 (Diptera, Streblidae) (INBIAL Dip. Streblidae 0004) found on *Noctilio albiventris*. Photo by Felix Ortiz.

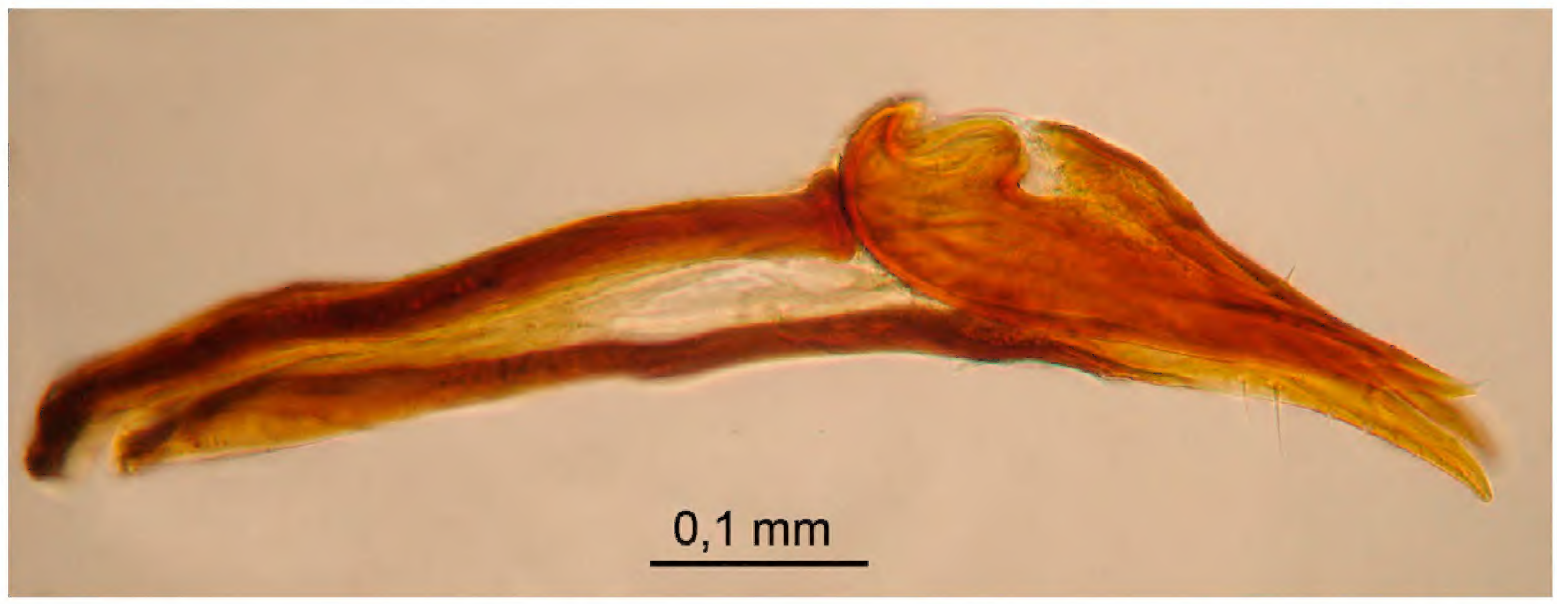

Figure 3. Male genitalia of *Paradyschiria parvula* Falcoz, 1931, lateral view of the aedeagus and gonapophysis (INBIAL Dip. Streblidae 0004). Photo by Felix Ortiz.

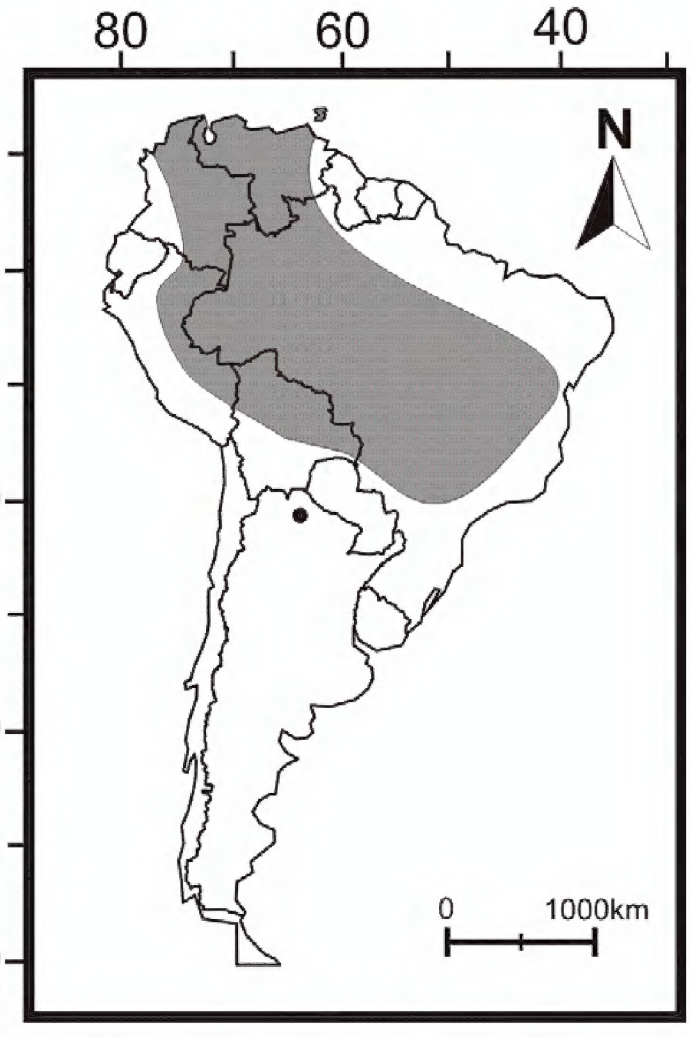

Figure 4. Map of South America showing the previous known distribution of *Paradyschiria parvula* (shadded in grey), and the new record from Argentina (black dot).

and with *Tadarida brasiliensis* in Tucumán (Schuurmans Stekhoven, Jr. 1951). Our record is the first in association with *M. nigricans*, and this is the first time that this Nycteribiidae is cited for Jujuy.

Taxonomy. The head in this species is characterized by four setae located on the anterior dorsal margin, and eight to ten notopleural setae. Females are differentiated by having a truncated triangular tergum I, with concave sides and two groups of eight to ten moderately long, narrowly spaced posterior setae. The tergal plate II is large and posteriorly rounded, with three to four moderately long setae, and a few spiny setae along the midline, and shorter, more widely spaced lateral setae. The tergal plate II also exhibits a small indentation in the middle of the posterior margin and short setae on the anterior superficies. The pleurae have stunted spines and a few short posterior setae. The anal segment is broadly conical, with a few short setae positioned on the posterior and anterior laterals. The genital plate has ten closely spaced bristles and a broad sclerotized strip that tapers to a point before the anus.The anal sclerite is absent.

Basilia neamericana Schuurmans Stekhoven Jr., 1951

Specimens examined (4). SALTA: Department Orán, Finca Chaguaral (24°02′52.15″ S - 064°00′07.35″ W): 4 (2 ♂ - 2 ♀) on four specimens of *Eptesicus furinalis* (3 ♂ and 1 ♀ released), 17-X-2008. Two specimens of *B. neamericana* were deposited on INBIAL (1 ♂ INBIAL Nycteribiidae 0014 and 1♀ INBIAL Nycteribiidae 0015) and two on CMLA (1 ♀ CMLA-3 and 1 ♂ CMLA-4).

Comments. This species has been cited on *E. furinalis* from Formosa, Jujuy, La Rioja, Salta, Santiago del Estero, and Tucumán (Schuurmans Stekhoven, Jr. 1951; Guimarães and D' Andretta 1956; Autino et al. 1999; 2000; 2009); it has also been cited on *Eptesicus diminutus* Osgood, 1915, from Salta (Autino et al. 1999). A new locality in Salta is given here for *E. furinalis*.

Taxonomy. The head in this species is characterized by having three distinct pairs of setae; two stunted pairs and an elongated pair that extend past the anterior point of the head. Ventrally, the thorax is longer than it is wide and has a ctenidium composed of 20 or 21 teeth. The thoracic pleura has a curved row of ten very long setae. The posterior border of the mesonotum does not exhibit a median process. The basal tergum of the abdomen is wider than it is long and presents a row of short, slender setae along its surface; eight setae are arrayed across the length of the apex, leaving a glabrous area along the central region of the border. Tergum II is notably longer than wide, with two shading lobes on its apex. The end of each lobe is crowned by a comb of long setae interspersed with short, rigid setae that form two or three transversal irregular rows. The anal tergum is relatively small and has a convergent lateral border with long setae and a posterior border with a middle notch. The pleura is bland and generally has short, pustule, spiny setae. This species is very similar to *B. plaumanni.*

Basilia plaumanni Scott, 1940

Specimens examined (2). JUJUY: Department Ledesma, Aguas Negras, Parque Nacional Calilegua (23°45′38.74″ S, 064°51′05.11″ W): 1 ♂ INBIAL Nycteribiidae 0016, 1♀ INBIAL Nycteribiidae 0017, on two specimens of *Histiotus laephotis* (1 ♂ and 1 ♀ released), 17-X-2008.

Comments. This species was cited for Salta, on *Histiotus macrotus* Poeppig, 1835 (Autino et al. 2009), and for Jujuy, on *H. laephotis* (Autino et al. 1999). There are also records on *Eptesicus furinalis* from Santiago del Estero and *H. laephotis* from Cordoba (García 1959). In this latter case, however, the record may be considered doubtful, as *H. laephotis* has not yet been reported from Cordoba (Barquez 2006). A new locality is given here for *H. laephotis* in Jujuy.

Taxonomy. The head in this species is characterized by having four to six setae on the anterior dorsal margin, two setae between the eyes, and eight to ten notopleural setae. Generally, the mesonotum of the females is distinguished by a posterior triangular elevation, though this feature is absent in some specimens. The tergum I of females exhibits a row of short, thin setae on the rounded posterior margin, while the tergal plate II is large and heart-shaped, with broadly rounded posterior processes that bear three long setae and 10–15 short spines. The female continues to be distinguished by a conical anal segment, with one to two longer posterior setae and various short lateral ones. The pleura is covered with minute spines, and the genital plate bears two to four long setae. The anal sclerite is small, with two setae, and is not connected to the genital plate.

In Argentina, 39 species of bat-hosting ectoparasite insects have been cited: 23 species of Diptera (17 from Streblidae and six from Nycteribiidae); nine species of Hemiptera (eight from Polyctenidae and one from Cimicidae), and seven species of Siphonaptera, including *Craneopsylla* and *Sternopsylla* with two subspecies each (*C. m. minerva* and *C. m. wolffhuegeli; Sternopsylla d. distincta* and *S. d. speciosa*) (Autino et al. 1999, 2005, 2009, 2014; Autino and Claps 2000; Claps et al. 2000; Claps and Autino 2012). The current study provides information regarding nine species of ectoparasitic insects from two provinces in northern Argentina: two from Streblidae (*A. scorzai* and *P. parvula*), three from Nycteribiidae (*B. currani*, *B. neamericana* y *B. plaumanni*), three from Siphonaptera (*H. pulex*, *M. isidori*, *M. w.wolffsohni*), and one from Polyctenidae (*H. vicinus*) collected from 41 bat specimens. This study added a new species of Streblidae to the 39 already recorded in Argentina: *P. parvula* in the province of Salta. *Hesperoctenes vicinus* was also added for the province of Salta and *B. currani* for the province of Jujuy, and new localities were registered for *A. scorzai, B. plaumanni, H. (R.) pulex* and *M. isidori* in Jujuy, and *B. neamericana* and *M. w. wolffsohni* in Salta. New host-ectoparasite associations were also recorded. In our sample, the majority of the bats were host to only one individual, with the exception of *N. albiventris*, which had six. In similar studies in Brazil, new specimens of *P. parvula* were found on five *N. albiventris*, but without information regarding the maximum number of ectoparasites per host (Graciolli and Bernard 2002).

Due to the small sample size of ectoparasites and their hosts analyzed in this study, we were not able to further explore the relationship between the species. Nevertheless, we did confirm monoxenous behavior in *H. vicinus* and *H. (R.) pulex*, which had been previously reported by Autino et al. (2009).

ACKNOWLEDGEMENTS

We want to specially thank the people and agencies that collaborated on the field trips,. A. J. Díaz for help in

the Parque Provincial Potrero de Yala, the Administración de Parques Nacionales, and the government of the province of Salta. Field activities and transit guide were authorized by the implementing agencies in each jurisdiction. This study was possible by the support from Idea Wild and Consejo de Investigaciones de la Universidad Nacional de Salta (Projects 1654, 1824 and 1944 of J. C. Bracamonte). We thank L. Krapovickas and R. Montero for assistance with the initial translation of this manuscript into English, and J. Richardson for the English review.

LITERATURE CITED

Autino, A.G. and G.L. Claps. 2000. Catalogue of ectoparasite insects of Argentina bats. InsectaMundi 14: 193–209. http://core.ac.uk/download/pdf/14523732.pdf

Autino, A.G. and M. Lareschi. 1998. Siphonaptera; pp. 279–290, in: J.J. Morrone and S. Coscarón (eds.). Biodiversidad de Artrópodos Argentinos, La Plata: Ediciones Sur.

Autino, A.G., G.L. Claps and R.M. Barquez. 1999. Insectos ectoparásitos de murciélagos de las Yungas de la Argentina. Acta Zoológica Mexicana (nueva serie) 78: 119–169. http://www1.inecol.edu.mx/azm/documentos/78/e-Autino.pdf

Autino, A.G., G.L. Claps and R.M. Barquez. 2000. Nuevos registros de Diptera y Siphonaptera en la Argentina. Boletín de Entomología Venezolana 15(1): 109–112.

Autino, A.G., G.L. Claps and F. Ortiz. 2005. Primera cita de *Sternopsylladistinctaspeciosa* (Siphonaptera: Ischnopsyllidae) para la provincia de Jujuy, Argentina. Revista de la Sociedad Entomológica Argentina 64(1–2): 34–36. http://www.scielo.org.ar/pdf/rsea/v64n1-2/v64n1-2a08.pdf

Autino, A.G., G.L. Claps, M.S. Sánchez and R.M. Barquez. 2009. New records of bat ectoparasites (Diptera, Hemiptera and Siphonaptera) from northern Argentina. Neotropical Entomology 38(2): 165–177. doi: 10.1590/S1519-566X2009000200002

Autino, A.G., G.L. Claps and R.M. Barquez. 2014. El género *Aspidoptera* Coquillett (Diptera, Streblidae) en la Argentina. Revista de la Sociedad Entomológica Argentina 73(1–2): 43–47. http://www.scielo.org.ar/pdf/rsea/v73n1-2/v73n1-2a10.pdf

Barquez, R.M. 2006. Orden Chiroptera; pp. 56–86, in: R.M. Barquez, M.M. Díaz and R.A. Ojeda (eds.). Mamíferos de Argentina. Sistemática y distribución, Mendoza: Sociedad Argentina para el Estudio de los Mamíferos (SAREM). http://www.sarem.org.ar/wp-content/uploads/2015/05/Mam.-Arg.-Sist.-y-distri_2006.pdf

Beaucournu J.C. and D. Castro. 2003. Contribution á un Inventaire des Puces d´ Argentina. Beiträge Zur Entomologie 53: 449–479.

Claps, G.L. and A.G. Autino. 2012. *Myodopsylla wolffsohni wolffsohni* (Rothschild) (Siphonaptera, Ischnopsyllidae) sobre murciélagos de la Argentina y Uruguay. Revista de la Sociedad Entomológica Argentina 71(1–2): 155–157. http://www.scielo.org.ar/pdf/rsea/v71n1-2/v71n1-2a16.pdf

Claps, G.L., A.G. Autino and R.M. Barquez. 2000. Nuevos registros de Streblidae (Diptera) para la Argentina. Acta Zoológica Mexicana (nueva serie) 80: 241–243. http://www.redalyc.org/articulo.oa?id=57508015

Del Ponte, E. 1977. Notas sobre Suctoria argentinas VIII. Revisión de las familias Hystrichopsyllidae, Stephanocircidae e Ischnopsyllidae (Ceratophylloidea). Revista del Museo Argentino de Ciencias Naturales «Bernardino Rivadavia» e Instituto Nacional de investigaciones de las Ciencias Naturales. Entomología 5(6): 1–141.

Del Ponte, E. and M.A. Riesel. 1939. Notas sobre "Siphonaptera" argentinos. II. Primera lista de especies. Physis, Argentina 17: 543–549.

Díaz, M.M., D.A. Flores and R.M. Barquez. 1998. Instrucciones para la preparación y conservación de mamíferos. Publicaciones especiales 1. PIDBA: Universidad Nacional de Tucumán, Tucumán. 44pp. http://www.pidba.com.ar/Instrucciones para Preparacion y Conservacion.pdf

Díaz, M.M., L.F. Aguirre and R.M. Barquez. 2011. Clave de identificación de los murciélagos del cono sur de Sudamérica. Cochabamba, Bolivia: Centro de Estudios en Biología Teórica y Aplicada. 94 pp.

Dick, C.W. 2005. Ecology and host specificity of bat flies (Diptera: Streblidae) and their Chiropteran hosts [Ph.D. dissertation] Lubbock: Texas Tech University. 253 pp.

Dick, C.W. 2007. High host specificity of obligate ectoparasites. Ecological Entomology 32: 446–450. doi: 10.1111/j.1365-2311.2006.00836.x

Dick, C.W., D. Gettinger and S.L. Gardner. 2007. Bolivian ectoparasites: a survey of bats (Mammalia Chiroptera). Comparative Parasitology 74(2): 372–377. http://digitalcommons.unl.edu/cgi/viewcontent.cgi?article=1053&context=parasitologyfacpubs

García, M. 1959. Diptera pupipara; pp. 579–580, in: J.R.F. Bejarano, E. del Ponte and R.N. Orfila (eds.). Primeras Jornadas Entomoepidemio1ógicas Argentinas 2, Buenos Aires: La Prensa Médica.

Graciolli, G. and E. Bernard. 2002. Novos registros de moscas ectoparasitas (Diptera, Streblidae e Nycteribiidae) em morcegos (Mammalia, Chiroptera) do Amazonas e Pará, Brasil. Revista Brasileira de Zoologia 19(Suppl. 1): 77–86. http://www.scielo.br/pdf/rbzool/v19s1/v19supl1a03.pdf

Guerrero, R. 1995. Catálogo de los Streblidae (Diptera: Pupipara) parásitos de murciélagos (Mammalia: Chiroptera) del Nuevo Mundo. V. Trichobiinae con alas reducidas o ausentes y misceláneos. Boletín de Entomología Venezolana, Nueva Serie 10(2): 135–160.

Guerrero, R. 1997. Catálogo de los Streblidae (Diptera: Pupipara) parasites de murciélagos (Mammalia:Chiroptera) del Nuevo Mundo. VII. Lista de especies, hospedadores y paises, Acta Biologica Venezuelica 17(1): 9–24.

Guimarães, L.R. and M.A. D'Andretta. 1956. Sinopse dos Nycteribiidae (Diptera do Novo Mundo). Arquivos de Zoologia do Estado de São Paulo (Revista do Museu Paulista) 10(1): 1–184.

Hopkins, G.H. and M. Rothschild. 1956. An illustrated catalogue of Rothschild collection of fleas (Siphonaptera) in the British Museum (N. H). Volume II. Cotopsyllidae, Vermipsyllidae, Stephanocircidae, Ischnopsyllidae, Hypsophthalmidae, and Xiphiopsyllidae. London: British Museum (Natural History). xi + 445 pp. + 32 pls.

Johnson, P.T. 1957. A classification of Siphonaptera of South America. Memoirs of the Entomological Society of Washington 3:1–298.

Marshall, A.G. 1982. Ecology of insects ectoparasitic on bats; pp. 369–401, in: T.H. Kunz (ed.). Ecology of bats, New York: Plenum Press.

Patterson, B.D., J.W.O. Ballard and R.L. Wenzel. 1998. Distributional evidence for cospeciation between Neotropical bats and their bat fly ectoparasites. Studies on Neotropical Fauna and Environment 33: 76–84.

Poulin, R. 1998. Evolutionary ecology of parasites. London: Chapman and Hall. 212 pp.

Presley, S.J. 2004. Ectoparasitic assemblages of Paraguayan bats: ecological and evolutionary perspectives [Ph.D. dissertation]. Lubbock: Texas Tech University. 326 pp.

Schreiter, R. and R.C. Shannon. 1927. Un nuevo e interesante género y especie de una pulga del murciélago. Boletín del Museo de Historia Natural, Universidad Nacional de Tucumán 1(12): 1–15.

Schuurmans-Stekhoven, J.H., Jr. 1951. Algunas especies del genero "*Basilia*" Ribeiro y creación del Nuevo género "*Guimarãesia*". Acta Zoológica Lilloana 12: 101–115.

ter Hofstede, H.M., M.B. Fenton and J.O. Whitaker Jr. 2004. Host and host-site specificity of bat flies (Diptera: Streblidae and Nycteribiidae) on Neotropical bats (Chiroptera). Canadian Journal of Zoology 82: 616–626. doi: 10.1139/z04-030

Ueshima, N. 1972. New World Polyctenidae (Hemiptera), with special reference to Venezuelan species. Brigham Young of University Sciences Bulletin, Biological Series 17: 13–21. http://biodiversitylibrary.org/page/7938284

Wenzel, R.L. 1970. Family Streblidae; pp. 1–25, in: N. Papavero (ed.). A catalogue of the Diptera of the Americas south of the United States. São Paulo: Museo de Zoologia, Universidade de Sao Paulo.

Wenzel, R.L. 1976. The streblid batflies of Venezuela (Diptera: Streblidae). Brigham Young University Science Bulletin, Biological Series 20(4): 1–177.

Author contributions: AGA and GLC wrote the text and identified the ectoparasites; JCB collected the data and identified the bats; FO prepared the ectoparasites and took the photos.

Received: 25 July 2015
Accepted: 21 April 2016
Academic editor: Marcelo R. Nogueira